

**The applicability of the Theory of Planned Behaviour in predicting adherence to  
antiretroviral therapy (ART) among a South African sample**

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University of Stellenbosch



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March 2011

**DECLARATION**

I, the undersigned, hereby declare that the work contained in this thesis is my own original work, and that I have not previously in its entirety or in part submitted it at any university for a degree.

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Signature

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Date

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## ABSTRACT

The primary aim of the study was to determine the applicability of the theory of planned behaviour (TPB) in predicting adherence to ART among South African patients attending public health clinics. The second aim was to determine the relationship between self-reported adherence and viral load. The results from the hierarchical multiple regression analyses revealed that the linear combination of the variables of the TPB significantly explained 12% of the variance in intentions to adhere to ART. Perceived behavioural control was the only variable that significantly predicted intentions to adhere to ART. The inclusion of perceived stigma was not a useful addition to the model. The results also reflect the relationship between intentions to adhere to treatment and self-reported adherence, which was not significant. The TPB was unable to significantly account for variance in self-reported treatment adherence. When perceived stigma was added to the TPB, the model was still unable to significantly explain variance in self-reported adherence. Nonetheless, attitudes towards treatment were the only variable that significantly accounted for variance in self-reported treatment. It was concluded that interventions aimed at improving adherence among South African patients attending public health clinics, should aim to encourage positive attitudes towards treatment, should aim to increase perceived subjective norms, should increase the patients' perceptibility that they are able to be adherent and should aim to decrease perceived stigma. Improving adherence to ART can result in increasing the quality of life of patients living with HIV/AIDS.

## OPSOMMING

Die primêre doel van die studie was om vas te stel of die teorie van beplande gedrag (TPB soos voorgestel in die studie) antiretrovirale terapie (ART) nakoming onder Suid-Afrikaanse pasiënte by publieke gesondheidsklinieke kan voorspel. Die sekondêre doel was om die verhouding tussen self-gerapporteerde volgehoue behandeling en virale lading te bereken. Die uitslae van die hiërargiese veelvuldige regressie analise het getoon dat die linêre kombinasie van die veranderlikes van TPB 12% van die verandering in ART voornemens akkuraat kon voorspel. Waargenome gedragsbeheer was die enigste veranderlike wat ART voornemens akkuraat kon verklaar het. Die insluiting van waargenome stigma was nie beduidend ten opsigte van die model nie. Geen beduidende verband tussen voorneme om met behandeling vol te hou en self-gerapporteerde volgehoue-behandelingsgedrag word uitgebeeld. Waargenome gedragsbeheer kon wel 'n bydrae lewer om verandering in die voorneme om met behandeling vol te hou verklaar. Die TPB kon egter nie 'n verduideliking bied vir die verandering in self-gerapporteerde volgehoue-behandelingsgedrag nie. Toe waargenome stigma by die TPB gevoeg is, was die model steeds nie daartoe instaat om die verandering in self-gerapporteerde volgehoue-behandelingsgedrag te verklaar nie. Nietemin, houdings teenoor behandeling was die enigste veranderlike wat verandering in self-gerapporteerde gedrag verklaar.

Daar is tot die gevolgtrekking gekom dat intervensies gerig op die verbetering van volhoubare gedrag onder Suid-Afrikaanse pasiënte wat openbare gesondheidsklinieke bywoon, positiewe houding teenoor behandeling moet aanmoedig, subjektiewe norme verhoog, die pasiënte se persepsie dat hulle instaat is om volhoubare gedrag kan toon moet verhoog en ook waargenome stigma moet verminder. Beter ART nakoming kan lei tot 'n toename in die MIV/VIGS pasiënt se kwaliteit van lewe.

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## TABLE OF CONTENTS

Declaration	ii
Abstract	iii
Opsomming	iv
Acknowledgements	v
List of tables	x
List of figures	xi
Chapter 1: Introduction, motivation and aims for the study	1
1.1 Introduction	1
1.2 Motivation for the study	2
1.3 Aims for the study	2
Chapter 2: Literature review and theoretical framework	3
2.1 Health behaviour	3
2.1.1 Adherence towards ART medication	4
2.1.2 Adherence and compliance	5
2.1.3 Methods for measuring adherence to ART	5
2.1.3.1 Self-reports	6
2.1.3.2 Pill counts	7
2.1.3.3 Medication Event Monitoring System (MEMS)	7
2.1.3.4 Pharmacy refill tracking	8
2.1.3.5 Biological markers	8
2.1.4 Social-cognitive models of health behaviour	9
2.1.4.1 Health Belief Model (HBM)	10
2.1.4.2 Trans-theoretical or stages of change model	11

2.1.4.3 Theory of Reasoned Action (TRA)	11
2.1.4.4 Theory of Planned Behaviour (TPB)	13
2.1.5 Application of TPB	18
2.2 The role of perceived stigma in adherence to ART	19
Chapter 3: Research Methodology	21
3.1 Introduction	21
3.2 Research Design	21
3.3 Research setting	21
3.4 Participants	21
3.5 Procedure	22
3.6 Incentives	22
3.7 Data Capturing	23
3.8 Measuring instruments	23
3.8.1 Attitudes towards treatment adherence	23
3.8.2 Perceived subjective norms	24
3.8.3 Perceived behavioural control	24
3.8.4 Intentions to adhere to treatment	24
3.8.5 Measure of HIV stigmatization	25
3.8.6 Self-reported adherence	25
3.8.7 Biological Markers	26
3.9 Data analysis	26
3.9.1 Predicting intentions	26
3.9.2 Relationship between intentions and self-reported adherence	27
3.9.3 Predicting self-reported adherence	28

3.9.4	Predicting viral load	29
3.10	Inclusion and exclusion criteria for participant selection	29
3.11	Ethical clearance procedure	29
3.12	Research Hypotheses	30
Chapter 4: Results		31
4.1	Demographic characteristics of the sample	31
4.2	Tests of parametric assumptions	34
4.3	Internal consistency of the measurement instruments of the present study	35
4.3.1	Self-reported adherence	35
4.4	Descriptive statistics of the sample	36
4.5	Correlation matrix of the predictor variables and the dependent variables	37
4.6	Predicting intentions	38
4.7	Bivariate correlation between intentions and self-reported adherence	42
4.8	Predicting self-reported treatment adherence	42
4.9	Bivariate correlation between self-reported adherence and viral load	46
Chapter 5: Discussion and conclusion		47
5.1	Predicting intentions to adhere to treatment	47
5.2	The relationship between intentions and self-reported treatment adherence	49
5.3	Predicting self-reported treatment adherence	49



5.4	The association between self-reported adherence and viral load	50
5.5	Implications of the study	51
5.6	Limitations of the study	51
5.7	Recommendations for future studies	52
	References	54
Appendices		
	Appendix A	69
	Appendix B	74
	Appendix C	77
	Appendix D	79
	Appendix E	81
	Appendix F	82
	Appendix G	83
	Appendix H	84

**LIST OF TABLES**

Table 1:	Demographic Characteristics of the Sample	31
Table 2:	Normality tests for Dependent Variables	35
Table 3:	Cronbach's alpha of the measures	36
Table 4:	Descriptive statistics characterizing Theory of a Planned and perceived stigma	37
Table 5:	Correlation matrix intentions to adhere to treatment and self-reported adherence	38
Table 6:	Hierarchical multiple regression summary for intentions to adhere to treatment	39
Table 7:	Parameters of the variables in predicting intentions to adhere to treatment	40
Table 8:	Correlation of intentions and self-reported treatment adherence behaviour	42
Table 9:	Hierarchical model summary of self-reported treatment adherence behaviour	43
Table 10:	Parameters of the variables predicting self-reported	44
Table 11:	Correlation of self-reported adherence and biological markers (viral load)	46

**LIST OF FIGURES**

Figure 1:	Basic components of the theory of planned behaviour	17
Figure 2:	Hierarchical regression model 1	27
Figure 3:	Hierarchical regression model 2	27
Figure 4:	Linear regression model 3	28
Figure 5:	Hierarchical regression model 4	28
Figure 6:	Hierarchical regression model 5	29
Figure 7:	Linear regression model 6	29

## **Chapter 1**

### **Introduction**

#### **1.1 Introduction**

HIV/AIDS is one of the largest public health problems in the world today, specifically in the developing world of which South Africa is a part. UNAIDS reported that in 2009 the prevalence of HIV infected people living in several countries in southern Africa, for example, Zimbabwe, Botswana, Zambia and South Africa was 34% (UNAIDS, 2010). South Africa is reported to have the highest number of people living with HIV/AIDS in the world (Quinn, 2001; UNAIDS/WHO, 2000). The prevalence of people living with HIV in South Africa was estimated at 5.6 million at the end of 2009 (UNAIDS, 2010). In an effort to treat the HIV/AIDS epidemic, antiretroviral therapy (ART), which plays a role in suppressing the replication of the HIV virus, was made available to South Africans in 2004 (Kagee, 2008). The number of patients that received ART in the Western Cape in 2004 was 2327 (Kagee, 2008), which has risen to 16234 patients in March 2006.

Consistent adherence to treatment instructions of ART is an issue that has an effect on health outcomes (Kagee, 2008); therefore adherence to ART is important for the treatment of HIV/AIDS to be successful. ART has been useful in improving the quality of life of HIV/AIDS patients, in minimizing the progression of the disease and reducing mortality (Bangsberg et al., 2000; Descamps et al., 2000; Gifford et al., 2000; Murri et al., 2000). Progression implies the development of an infection or a decrease in the CD4 cell count (which can be used to determine the stage of the disease) below 200 cells/  $\mu\text{l}$  (Bangsberg et al., 2001). Bangsberg et al. (2001) reported findings which indicated a strong relationship between the level of adherence to ART

and the risk of progression to AIDS in HIV-positive urban poor adults with a high risk of non-adherence.

ART as a life-long treatment adherence is often a challenge (Wang & Wu, 2007). Poor adherence is associated with medication side-effects, stressful life events, poor social support and the complexity of the medication regimen (Ammassari et al., 2002). In addition, it was found that substance abuse and neuropsychological impairment can lead to non-adherence (Hinkin et al., 2002). The consequences of poor adherence include the development of viral resistance, biological failure, progression of disease, and death (Bangsberg et al., 2000). In order to minimize the dire consequences of poor adherence, it is important to predict the likeliness to adhere to ART by the patient.

## **1.2 Motivation for the study**

For the purpose of this study the Theory of Planned Behaviour (TPB) is used as a theoretical model to predict adherence to ART within a South African context. If it is found that this model was applicable within a South African context, then it can be used for health behaviour interventions (Montaño, & Kasprzyk, 2002), for example to enhance adherence to ART. This may contribute to ART improving the quality of life of those living with HIV.

## **1.3 Aims for the study**

The main aim of the study was to predict adherence to ART by using the TPB. The secondary aim was to determine the relationship between self-reported adherence and viral load as a biological marker. The aims of the study can be reached through the following objectives:

The first objective was to determine the applicability of TPB in predicting adherence to ART among South African patients attending public health clinics. As

such, the following variables of TPB were assessed: attitudes towards ART adherence, perceived subjective norms and perceived behavioral control. An additional variable, namely perceived stigma was also assessed.

The second objective of the study was to determine the correlation between self-reported treatment adherence and viral load.

## Chapter 2

### Literature Review and Theoretical Framework

#### 2.1 Health Behaviour

The concept of health behaviour entails any activity that people perform to maintain or improve their health (Sarafino, 2008). According to Feuerstein, Labbe and Kuczmierczyk (1987, p.240) health behaviour is “any activity undertaken by a person believing him- or herself to be healthy for the purpose of preventing disease or detecting it in an asymptomatic stage”. However, health behaviour is influenced by cognitive and emotional states which can be reported and assessed. Therefore, Gochman (1982, 1997) (quoted in Glanz et al., 2002, p.12) defined health behaviour as:

Those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behaviour patterns, actions and habits that relate to health maintenance, to health restoration, and to health improvement.

Similarly, Kasl and Cobb (1966a) defined three categories of health behaviour which encompasses Gochman’s definition. These categories included preventive health behaviour, illness behaviour and sick-role behaviour. Preventive health behaviour refers to activities where an individual believes himself (or herself) to be healthy. For example, quit smoking to prevent lung cancer. Illness behaviour is an activity where the individual believes himself or herself to be ill, and strive to find an appropriate treatment and also to define the state of health (Kasl & Cobb, 1966a). Sick-role behaviour, on the other hand, is any activity where an individual considers

himself or herself as ill, with the intention to become well again. It includes receiving treatment from medical providers, usually involves a whole range of dependent behaviours, and leads to the individual being freed from his or her usual responsibilities (Kasl and Cobb, 1966b).

Thus, health behaviour is a combination of actions by people in order to prevent the risk factors associated with disease or to search for appropriate treatment options to treat disease. For the purpose of this study health behaviour refers to actions taken by participants to adhere to ART regimens.

### **2.1.1 Adherence to ART medication**

Medication adherence is a very important type of health behaviour in persons living with HIV in order to ensure optimal health outcomes. Adherence has been defined by the World Health Organisation (2003), by combining two authors' definitions (Haynes, 1979; Rand, 1993), as the "extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider" (WHO, 2003, p. 3). A high rate of adherence, which is concerned with the correct dosage taken precisely at the right time and in the right manner, is preferable for successful antiretroviral treatment. At least 95% of adherence is necessary for ART to be effective in lowering the risk of drug resistance and reducing morbidity and mortality (Paterson et al., 2000).

According to Paterson et al. (2000) patients who take their medication less than 95% of the time are regarded as poorly adherent. Miller (1997) (cited in Kagee, 2008) suggests that non-adherence to ART is indicative of the patient not taking the prescribed medication whatsoever, taking the wrong dose of medication, or stop taking his or her medication without consulting the health care provider. Non-



adherent patients are 3.8 times more likely to die due to AIDS- related opportunistic infections than an adherent patient who follows the same treatment (de Ollalla et al., 2002; Lewis, Colbert, Erlen, & Meyers, 2006)

### **2.1.2 Adherence and Compliance Terminology**

Adherence involves a mutual decision-making process between the patient and the health care provider. The term “adherence” suggests that the patient plays an active role in the decision making process as well as committing to follow the prescribed treatment (Population Council et al., 2004 as cited in Wekesa, 2007). Conversely, Trostle (1988) suggests that compliance refers to patients strictly following the health care providers’ instructions regarding regimen specifications. In essence it is an act of conforming and also implies a lack of patient participation (Trostle, 1988). This change in terminology thus represented an ideological shift in the way health care is considered by moving away from the authoritative instructions (compliance) to a more collaborative process between the patient and the health care provider (adherence) (Wekesa, 2007).

### **2.1.3 Methods for measuring adherence to ART**

There are a number of instruments that have been developed to assess levels of adherence. As a means of simplifying the process, Garcia, Schooley and Badaro (2003) grouped the instruments into two categories: those that use information derived from the patient, namely self-reports; and those that independently monitor drug intake, such as pill counts, Medication Event Monitoring System (MEMS), pharmacy refill tracking and biological markers. The strengths and weaknesses of these methods are discussed below.

### ***2.1.3.1 Self reports***

Patient self-reporting is the most commonly used method for assessing adherence in people living with HIV/AIDS. In this method, questions are posed to patients to determine their self-reported adherence. It is important to determine if a patient can recall whether a dosage was missed. The recall period used could be a few days, one week, one month or the most recent recollection of missing a dosage (Population et al., 2004).

Self-reporting is a simple and quick tool to use in a clinical or field research setting (Population et al., 2004), especially in resource-poor areas. Nevertheless, there has been a lot of concern about its accuracy in measuring adherence. Many studies have observed that self-reporting over-estimates adherence, as patients may report to be perfectly adhering when, in actual sense, they are not (e.g. Garcia et al 2003; Wagner et al., 2001). Therefore, Wagner et al. (2001) has called for verification by health care providers on self-reported adherence. They further observed that a patient's report of non-adherence is more accurate than the report of adherence. However, Duong et al. (2001) provides evidence that contradicts the idea that self-reporting over-estimates levels of adherence. Their findings indicate that for a short recall period of four days, the self-reported adherence coincide with adherence measured by viral load monitoring. Therefore, the best way to improve the efficacy of self-reporting is to use a short recall period.

### ***2.1.3.2 Pill counts***

Another means of measuring adherence is the use of pill counts by the health care provider. In this method the patients are asked to bring their medication to scheduled clinic visits, at which time the pills are counted by the health care provider (Poppa et al., 2004). This method has the advantage of being simple, cheap, and objective in assessing adherence. However, several problems are associated with this method. The method relies on the patients to bring all of their medication to clinic visits. Some studies have reported that patients resort to pill dumping or pill sharing preceding their scheduled clinical visits (Wagner et al., 2001). Consequently, this method may lead to an over-estimation of adherence. Unannounced pill count visits could help with improving the accuracy, but could undermine patients' confidentiality, and is a more costly exercise to implement.

### ***2.1.3.3 Medication Event Monitoring System (MEMS)***

MEMS is a method that uses an electronic device that is fitted on the lid of the medication bottle. This device records the time and date of opening and closing of the lid, which is assumed to be related to intake of the medications (Poppa et al., 2004). This information is collected during clinic visits using computer software, which generates a written report (McNabb et al., 2001).

The advantage of MEMS is objective monitoring of drug intake and the intervals between doses. However, studies have shown that MEMS under-estimate adherence because patients may take out multiple doses simultaneously for later intake (Garcia et al., 2003). The method can also be ineffective when patients lose the lid or leave it off. Furthermore, it is very expensive and its use is not practical in poor

resource constrained areas. The effectiveness of this method can be improved by educating patients on how to use it (Garcia et al., 2003).

#### ***2.1.3.4 Pharmacy refill tracking***

This method uses pharmacy refill data to estimate adherence. It is construed that patients who collect their medications regularly are adhering to the treatment (Garcia et al., 2003). For this method an effective record keeping system needs to be set up in the pharmacy. This method has the advantage of being a simple and an objective measure of adherence. Nevertheless, this method has also been associated with some problems. Firstly, the assumption that scheduled medication collection is equivalent to perfect adherence is contradictory. Patients may not actually be taking their medication but could be sharing them with family and friends, or discard the pills (Bangsberg, & Machtinger, 2006). In addition, the timing of the dosage cannot be determined with this method. This method relies on well-kept records, which is rarely the case in most poor regions, where computers and electricity are unreliable. Finally, the method requires that patients use the same pharmacy for all refills (Garcia et al., 2003).

#### ***2.1.3.5 Biological markers***

Biological markers are used to assess adherence by monitoring the level of the viral load in the blood stream. Since ART is supposed to suppress increase of the HIV/AIDS virus, low levels of viral load is a sign of adherence to the regimen. Viral load monitoring is not very expensive and it is quite easily available in poor resource settings (Wekesa, 2007).

Despite being objective, and a highly advanced manner of measuring adherence, this method has problems which render it unsuitable in some areas. First, there is increasing reports that viral loads could still remain high even when the

patient is adherent (Wagner et al., 2001). The reasons for this include treatment failure, ART drug resistance, and poor drug intake (Wagner et al., 2001; Population Council et al., 2004). An alternative biological marker is CD4 cell counts, which are a determinant of how far the disease has progressed, can also be used to assess adherence. However, one recent paper reported that CD4 counts are not as effective as viral loads in determining treatment failure among HIV patients on ART (Chaiwarith et al., 2007).

In this study self-reports and viral load as a biological marker were used to measure adherence to ART. In a study conducted by Arnsten et al. (2001), self-reported adherence moderately correlated with concurrent HIV load ( $r = 0.4-0.5$ ), which is similar to the result of the study by Bangsberg et al. (2000). Although self-report overestimates adherence, the above mentioned data are valid and reliable for use in research settings (Arnsten et al., 2001).

#### **2.1.4 Social-cognitive models of health behaviour**

Adherence can further be explained by different theories and models in proposing ways how to accomplish behaviour change. (Glanz et al., 2002; Fisher & Fisher, 1992; Kok et al., 2004; Steyn, 2005). Theories of health behaviour seek to explain why individuals engage in, or fail to engage in, health-related behaviours. These theories are on the individual-level and explain health behaviour from the perspective of an individual. The theories also focus more on attitudes and beliefs as determinants of behaviour rather than other influences such as environmental conditions (Noar, 2005-2006). A brief synopsis of the theories widely used and applicable to HIV/AIDS literature is provided below. The following theories are of importance: Health Belief Model (HBM), Theories of Reasoned Action (TRA) and

Planned Behaviour (TPB), Social cognitive theory, and the Transtheoretical Model (TTM) (Glanz, Rimer and Lewis, 2002).

#### ***2.1.4.1 The Health Belief Model (HBM)***

The Health Belief Model (HBM) was developed in the 1950's and focuses on the health beliefs of an individual (Noar, 2005-2006). Furthermore, Rutter and Quine (2002) cited in Rosenstock (1966, 1974a, 1974b) who suggested that people are inspired to engage in preventive behaviours to reduce a perceived threat to their health. This concept of perceived threat is divided into two components: Perceived susceptibility (discernment that one is at risk for an illness or negative health outcome) and perceived severity (the perceived seriousness of a disease) (Noar, 2005-2006). Thus, an individual taking action includes high perceived susceptibility and perceived severity towards the illness (Janz and Becker, 1984). However, the degree to which an itinerary of action is successful depends on what benefits the patients believes will be gained when weighed against cost of or barriers to the action (Rutter and Quine, 2002). Internal or external cues can trigger the appropriate health behaviour. Internal cues refer to symptoms, while external cues refer to stimuli in the environment, for example, interpersonal (Janz and Becker, 1984; Becker, 1974).

HBM was not chosen for the purposes of this study because the model is concerned with HIV-preventive behaviour whereas the present study focuses on treatment behaviour (Lewis & Kashima, 1993; Montgomery et al., 1989; Warwick, Terry & Gallois, 1993). The weakness of the health belief model, according to Warwick et al. (1993), is that it does not have clear guidelines about how variables should be processed, especially the benefits and barriers components. This results in inconsistencies in the way the variables are conceptualised and processed across studies, making it difficult to compare studies using HBM (Wekesa, 2007).

#### ***2.1.4.2 The Trans-Theoretical or stages of change model***

The Trans-Theoretical or stages of change model refers to an individual's readiness to change a behaviour, progressing through five stages of change (Prochaska and DiClemente, 1983). The stages include pre-contemplation (no intention to change behaviour); contemplation (intending to change in the near future); preparation (getting ready to change in the near future); action (presently engaged in change); and maintenance (steady state of change reached). The relapse occurs when the individual regresses to an earlier stage of the change process (Bogart & Delahanty, 2004; Marlott et al., 2000; Prochaska, Redding & Evers, 2002; Rimer, 2002; Weinstein & Sandman, 2002).

For the purposes of this study, the trans-theoretical model was not used because it would have required a complex and impractical research design. According to Weinstein et al. (1998), this model entails that people is assigned to stages on the basis of their responses to questions concerning their previous behaviour and present behavioural intentions. Although the five stages are meant to be equally exclusive, the specific time periods used to distinguish between stages are illogical, thus making it difficult to guarantee people's correct assignment across stages. Weinstein and Sandman (2002) admit that people in any one stage of change are varied, and it is difficult to frame health messages that will address all needs.

#### ***2.1.4.3 Theory of Reasoned Action (TRA)***

The Theory of Reasoned Action (TRA) was introduced in an effort to understand the relationship between attitude and behaviour (Ajzen & Fishbein, 1980). This theory specifically focuses on explaining the relationship between beliefs, attitudes, intentions and behaviour. The most precise determinant of behaviour, according to the TRA, is behavioural intentions. Furthermore, behavioural intentions

are made up of two components, namely attitudes and subjective norms. The TRA conceptualised attitudes as a person's beliefs about the outcomes of engaging in a specific behaviour (behavioural beliefs), as well as an estimation about how much one values these beliefs (evaluation) (Noar, 2005-2006). According to the TRA, subjective norms of a person refer to beliefs about whether other individuals approve or disapprove of the performance of a behaviour (normative beliefs), weighted by his or her motivation to comply with these individuals (Ajzen & Fishbein, 1980; Montano & Kasprzyk, 2002). Montano and Kasprzyk (2002) are of the opinion that the theory of reasoned action is successful in explaining behaviour when volitional control is high. Volitional control refers to the degree of control that an individual can exercise over behaviour (Glanz et al., 2002).

#### ***2.1.4.4 The Theory of Planned Behaviour (TPB)***

The Theory of Planned Behaviour (TPB) is an extension of the TRA and it is more appropriate in conditions where volitional control is low (Ajzen, 1991). The TPB postulates that volitional behaviour is associated with the intention to engage in a specific behaviour (Rhodes, & Courneya, 2004). According to this, an individual will engage in a specific behaviour when his or her intention to engage in such behaviour is strong (Ajzen & Fishbein, 1980).

TPB differs from TRA because of the addition of perceived behavioural control to the theory in an attempt to account for factors outside a person's volitional control that may affect a person's intentions and behaviour (Ajzen, 1991). The TPB also states that intentions are the best predictor of behaviour (Rhodes & Courneya, 2004). Intentions can be defined as a plan of action to achieve behaviour goals (Ogden, 2000). According to Ajzen (cited in Rhodes & Courneya, 2004) it is a person's motivation to act in a certain way. Ajzen and Madden (1986) postulates that



in cases where one does not have complete volitional control over behaviour, perceptions of control are important determinants of health behaviour.

According to the TPB, there are three factors that influence human behaviour and intentions to engage in specific health behaviours. These factors are behavioural beliefs, normative beliefs and control beliefs. Behavioural beliefs are beliefs about the consequences or attributes of behaviour. Normative beliefs are about expectations such as approval or disapproval of the performance of behaviour by other people. Control beliefs are beliefs about the factors that are able to enhance or hinder performances of the behaviour.

Control beliefs above all, are central to the TPB as an extension to the TRA. Individuals' well-being is associated with a sense of control over their internal psychological environment (Shapiro, Schwartz and Astin, 1996). Research shows that patients who believe that they can do something about (have control over) their disease have a more positive psychological adaptation relative to those who do not hold such beliefs (Shapiro, Schwartz and Astin, 1996). For example, the personal control of patients being treated for a chronic illness is associated with increases in their self-esteem, quality of life and positive mood (Cunningham, Lockwood and Cunningham, 1990).

According to Rotter (1966), the concept of locus of control is identified as one way of studying individuals' self-perceptions of control. Rotter (1966) concludes that an individual's feeling that rewards depend on his or her own behaviour or are controlled by forces outside of themselves determine his or her self-perceptions of control in a given situation. Individuals who view proceedings outside of their control have an external locus of control, whereas individuals who perceive proceedings on their own behaviour have an internal locus of control (Ajzen, 2002). Those with a

high internal locus of control have better control of their behaviour and tend to exhibit more political behaviours than external locus of control individuals and are more likely to attempt to influence other people. They are also more likely to assume that their efforts will be successful. They are more active in seeking information and knowledge concerning their situation.

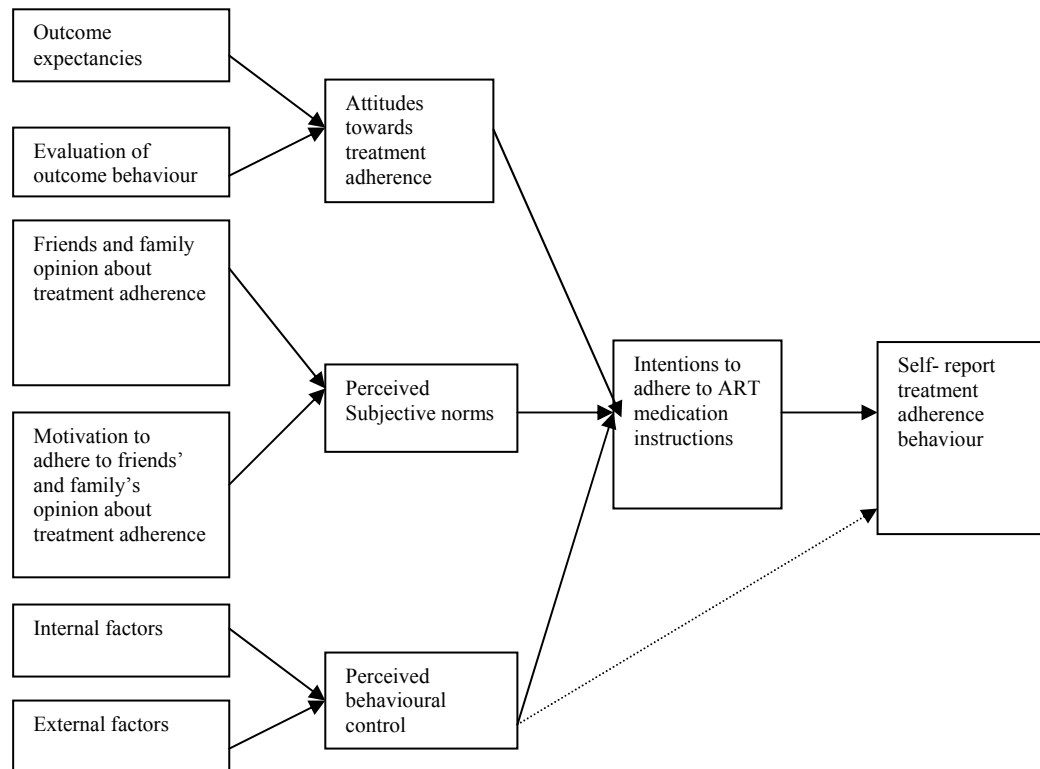
Each of these beliefs (behavioural, normative and control beliefs) give rise to three different factors which includes, respectively, attitudes towards behaviour, perceived subjective norms and perceived behavioural control (see figure 1) (Ajzen, 2002). Attitudes towards behaviour include an individual's beliefs about the outcome of the behaviour and also the evaluations of these outcomes. Attitudes towards treatment adherence, for instance ART adherence, refer to an individual's evaluative opinions, which can be either negative or positive, of the outcome of behaviour (Ogden, 2000). A positive attitude towards behaviour is related to its practice, whereas a negative attitude is not (Horne, Clatworthy, Polmear, & Weinman, 2001). For instance, it was found that negative attitudes toward ART are related to non-adherence among HIV positive patients in the United States (Viswanathan, Anderson, & Thomas, 2005). Horne et al. (2001) reported that a lot of patients do not adhere to treatment because of a certain attitude towards the medication, or the duration of the disease. However, if a patient is educated about their disease as well as the treatment procedure, they will more likely adhere to the instructions (Horne et al., 2001).

Perceived subjective norms are a person's evaluation of others' expectations of a specific behaviour (O'Boyle et al., 2001). According to Ogden (2000) social pressure encourages people to act in a socially desirable way which motivates them to comply with these social expectations. Therefore, if a significant other (for example, family or friends) thinks an individual should perform behaviour and the individual is

highly motivated to meet the expectations of the significant other, the individual will have positive subjective norms. A negative subjective norm, on the other hand refers to the beliefs of an individual that behaviour should not be performed according to the significant other (Ogden, 2000). According to Finlay, Trafimow and Jones (1997) subjective norms were a better predictor of intentions than attitudes towards behaviour. Thus, a patient that is under normative control will more likely engage in healthy behaviour than a patient that is under the influence of their attitude (Finlay, Trafimow and Jones, 1997). Connor and Armitage (1998) have also found subjective norms to be predictive of intentions. However, several studies have shown that subjective norms are not predictive of intentions, which could be a result of poor measurement and the need to expand normative components (e.g. Sheppard et al., 1988; Van den Putte, 1991; Sparks, Shepherd, Wieranga, & Zimmerman, 1995).

Perceived behavioural control plays a very important role within the TPB. It refers to an individual's belief that he or she can engage in a specific behaviour. This belief takes into account both internal and external factors. Internal factors are the abilities, skills or information that he or she possesses, whereas external factors are the opportunities or barriers that he or she may experience (Ajzen & Fishbein, 1980; Ajzen, 2002). The concept of perceived behavioural control is based on perceived self-efficacy which is "concerned with judgement of how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p.122). Thus, a person who holds strong control beliefs about factors that facilitate behaviour will have high perceived control, which translates into an increased intention to perform the behaviour (Ajzen, 1991; Montano & Kasprzyk, 2002). According to the TPB, there can be a direct interaction between perceived behavioural control and behaviour, without taking into account the relationship between behaviour and

intentions (Bryan, Fisher & Fisher, 2002). Figure 1 below is a pictorial representation of the TPB as applied to the context of ART adherence.



*Figure 1: Basic components of the Theory of Planned Behaviour (Ogden, 2000)*

The Theory of Planned Behaviour was chosen for this study because it is the theory most cited in HIV/AIDS research, and have been found to be a better predictor of HIV/AIDS health behaviour than other models (Fishbein, 1993; Terry, Gallois & McCamish, 1993; Warwick et al., 1993). The research reviewed was conducted mainly in North America and Europe, hence the need to test the relevance of the theories to the South African context. Health behaviour – adherence behaviour in the context of this study – does not occur spontaneously. It is the result of a decision-making process that involves an individual processing the information available to him/her. Thereafter, deciding on a course of action after reflecting on the consequences of performing the behaviour and his/her beliefs about what other people

expect him/her to do. As attitudes and beliefs have been shown to be significant in people's choice of action, the theory of planned behaviour is relevant to behaviour change.

### **2.1.5 Application of TPB**

The theory of planned behaviour has been used to predict different health behaviours, for example compliance among psychiatric patients (Conner, Black, & Stratton, 1998), prediction of clinical glove use among patients (Watson & Myers, 2001) and predicting chronic back pain sufferers' intention to exercise (Carroll & Whyte, 2003). In a psychiatric study it was found that compliance or adherence is based on strong intentions to comply and high perceived behavioural control over compliance. Thus, higher levels of compliance will be reached when interventions that focus on increasing these two factors are used. The results of the study also indicates that intentions to comply are based on positive attitudes towards complying, high perceived social pressure to comply and also high perceived behavioural control over complying (Conner, Black, & Stratton, 1998).

Research conducted on the application of the TPB mainly made use of Western samples. However, the applicability thereof has been explored in the Western Cape, South Africa, in predicting dietary and fluid adherence among haemodialysis patients (Fincham, Kagee, & Moosa, 2008; Kagee and Van der Merwe, 2006). Fincham, Kagee and Moosa (2008) used the TPB to predict dietary and fluid adherence among haemodialysis patients. The authors concluded that "the full TPB model was not optimal in explaining variance in self-reported dietary and fluid adherence, potassium levels, phosphate levels, or IDWG" (p. 4). Multiple regression analyses revealed that Attitudes, and Perceived behavioural control (PBC) explained 15.5% of variance in self-reported adherence. Ogden (2000) reported that PBC may

have a direct effect on behaviour. Similarly, Fincham et al. (2008) found that PBC on its own explained 14.3% of the variance in self-reported adherence. Thus, positive attitudes and high perceived behavioural control were related to dietary and fluid adherence.

Kagee and van der Merwe (2006) used the TPB to predict treatment adherence among patients at public health clinics in the Western Cape of South Africa. The results showed that the TPB explained 47% of the variance of intentions to adhere to treatment. It was also found that Perceived behavioural control was the strongest predictor of intentions to adhere to treatment (beta = 0.59). Perceived subjective norms also significantly related (beta = 0.21) to intentions to adhere to treatment. However, no significant relationship was found between attitudes and intentions to adhere to treatment (Kagee & van der Merwe, 2006). The results also revealed that Attitudes and Perceived behavioural control accounted for 23% of the variance in adherence behaviour, whereas subjective did not predict adherence behaviour.

## **2.2 The role of perceived stigma in adherence to ART**

A person may experience anxiety or fear of being stigmatized against, which can heighten their concern about status disclosure. Disclosure of one's HIV status is problematic because it can lead to rejection (Chesney & Smith, 1999; Lee et al., 2002), self-imposed isolation, missed opportunities for seeking early treatment, and difficulty gaining access to formal and informal services (Carr & Gramling, 2004; Chesney & Smith, 1999; Lee et al., 2002). Furthermore, stigma influences an individual's decision to disclose their HIV status and also their willingness to seek appropriate care (Rohleder & Gibson, 2005). An individual will weigh the outcome of the benefits to the risks of disclosing their HIV status. Access and the consumption of HIV medication is made difficult because of the fear of revealing one's HIV status to

others, which then require the person to take their HIV medication at inappropriate times and also in less private environments, for instance at work and restaurants.

Stigma and discrimination may present barriers to good adherence to ART. Literature shows that perceived stigma and internal stigma were inversely associated with adherence in different countries, for example in the United States of America (US), Peru and The United Kingdom (Roberts, 2005; Stirratt et al., 2006; Ware, Wyatt, & Tugenberg, 2006; Calin et al., 2007; Melchoir, Nemis, Alencar and Buchalia, 2007). It was found that the relationship between perceived stigma and internal stigma persisted, even after controlling for other factors using multivariate regression analysis. In an US study it was reported that patients with high stigma concerns were 3.3 times more likely not to adhere to ART (Dlamini et al., 2009). On the other hand, a study done in Peru reported that stigma decreased and adherence improved with intensive investment in daily adherence support (Franke et al., 2008). Similarly, a decrease in stigma and discrimination resulted from the availability of ART and the change in people's perceptions of HIV/AIDS as a manageable chronic illness (Herek, Capitano, & Widaman, 2002).

Relatively few (if any) studies have applied the TPB to ART adherence within a South African sample of HIV infected patients in poor resource settings. However, the TPB has been applied in several studies in explaining adherence in various health behaviours (e.g. Ajzen, 1988; 1991; Conner & Sparks, 1996). The present study is a continuation of the literature that examines the applicability or the relevance of TPB in understanding adherence to medication.

## **Chapter 3**

### **Methodology**

#### **3.1 Introduction**

Chapter 3 deals with the methodology used in this study, including a detailed description of the data analysis.

#### **3.2 Research Design**

The design of the present study was a cross-sectional quantitative design.

#### **3.3 Research Setting**

The study was conducted at a public health clinic in the town of Somerset-West in the Helderberg Health District of the Cape Town Metro Region in South Africa's Western Cape Province. Patients are referred to the hospital from surrounding areas in the Overberg district. There are 120 inpatient beds which cater for most specialties.

The public health clinic has been in operation since 2004 and enrolls approximately 30 to 60 new AIDS patients every month. Given the large numbers of patients enrolled at the clinic, it was quite feasible to meet our goal of recruiting 100 patients for the study.

#### **3.4 Participants**

One hundred and seven HIV positive patients were selected by means of convenience sampling. The participants were mostly from poor resource areas. The age range of the participants was between 20 and 51 years. Table 1 shows the demographic information of the sample.



### **3.5 Procedures**

One hundred and seven HIV positive patients were selected by means of convenience sampling. On arrival at the hospital the nurses were handed a flyer that describes the present study. The nurses told the patients, waiting for their doctors' consultation in the waiting room, about the study and distributed the flyers amongst the patients.

Patients who wished to participate were asked to approach the two researchers who waited in a private office at the clinic. The researchers then explained the study to the patient. Upon agreement, the patient provided informed consent to part take in the study. They were also informed that participation was not compulsory and that any information they gave was confidential. After informed consent (see Appendix A) had been provided the battery of questionnaires were administered. The questionnaire was made available in English, Afrikaans and Xhosa. All questionnaires were translated by a professional translation service, the language centre, at Stellenbosch University. The questionnaire was read to participants who were semi-literate or non-literate. In order to avoid embarrassment on the part of participants, they were asked whether they prefer to complete the questionnaire themselves or whether the researcher should read the questions to them. Literacy was not assessed as this was outside the scope of the study. Ethical clearance and permission to conduct the research were obtained from the relevant review boards.

### **3.6 Incentives**

Snacks were made available to all patients regardless whether they participate or not. The nurses and counsellors each received a R100 voucher since they helped the investigators in recruiting participants.

### **3.7 Data capturing**

The 107 completed questionnaires were entered in SPSS. Two integrity checks were conducted on the data set. Participants 2, 4, 25, 102 and 105 were excluded since chart data revealed that they were on ART medication for less than six months. Participant 89 was excluded due to misunderstanding of the questions on the questionnaires and there were inconsistent answers throughout the questionnaire.

### **3.8 Measuring Instruments**

All measures were administered in Afrikaans, English and isiXhosa.

#### **3.8.1 Attitudes toward treatment adherence**

The Adherence Attitude Inventory (AAI) (see Appendix D) was used to test attitudes toward treatment adherence. The AAI is a 28-item, Likert-type instrument (Lewis & Abell, 2002), which was initially developed for use with AIDS patients but can now also be used for other illnesses. This instrument assesses cognitive functioning, patients/health worker communication, self-efficacy and commitment to treatment adherence. The reliability of the instrument as indicated by Cronbach alpha was 0.75 (Lewis & Abell, 2002). High scores indicate a more positive attitude towards treatment. According to Lewis and Abel (2002), the subscale commitment to adherence is important in both reasoned and planned behaviour. The authors' also stated that commitment to adherence is similar to intentions. Furthermore, commitment to adherence and patient-provider communication were positively correlated, implying that a patient's relationship with the health care provider affects his or her commitment to adherence or vice versa (DiMatteo, 1998). Therefore, commitment to adherence and patient-provider communication subscales were used in the present study.

### **3.8.2 Perceived subjective norm**

An eight-item questionnaire was developed to calculate perceived subjective norms (with four Likert scale responses ranging from “strongly disagree” to “strongly agree”) (see Appendix E). A similar questionnaire was used in a study conducted by Kagee, Fincham and Moosa (2008) and the Cronbach alpha was 0.61. This questionnaire was modified to apply to a specific illness population, for instance patients diagnosed with HIV and taking ART.

### **3.8.3 Perceived behavioural control**

Perceived behavioural control was measured using an eight-item questionnaire assessing self-efficacy to engage in adherence-related activities (see Appendix F). A similar questionnaire used by a study conducted by Kagee and van der Merwe (2006) has a Cronbach alpha of 0.57. This questionnaire was specific to a certain illness population and specific kind of treatment, for instance patients with diabetes and hypertension patients, and need to be adapted to be applicable to patients with HIV. The items of the questionnaire were modified to be illness specific. Cronbach’s alpha reliability coefficient was calculated and is reported in the results section.

### **3.8.4 Intentions to adhere to treatment**

An eight-item, three-response-option Likert-type scale was constructed to measure intentions to engage in various adherence-related activities (see Appendix G). A similar questionnaire used in a study conducted by Kagee and van der Merwe (2006) has a Cronbach alpha of 0.72. This questionnaire focuses on patients with diabetes and hypertension and need to be adapted to be context specific. Cronbach’s alpha reliability coefficient of the new modified questionnaire was calculated and is reported in the results section.

### **3.8.5 Measures of HIV stigmatization**

The HIV stigma scale was used in the present study to assess perceived stigma (Berger et al., 2001) (see Appendix H). This 40-item scale includes four subscales: Personalized stigma, disclosure concern, negative self-image, and concern with public attitudes. First, personalized stigma includes 18 items and addresses the perceived consequences of knowing that the respondent has HIV, including losing friends, feeling that people are avoiding them, and having regrets about having told people.

Second, disclosure concern includes 10 items and is related to controlling information, keeping one's HIV status secret, or worrying that those who know about the HIV-infected individual's status will tell others. Third, negative self-image includes 13-items which refer to feeling unclean, not as good as others or bad as a person because of being HIV-infected. Finally, concern with public attitudes includes 20 items and refers to what "most people" think about a person with HIV or what most people with HIV can expect when others learn about their HIV infection.

Scale and subscale scores can be calculated by adding the values of the items belonging to that scale. Higher scores on any of the subscales are an indication of an increase in perceived stigma. Participants were asked to respond about a particular statement on a scale of 1 (strongly disagree) to 4 (strongly agree). The overall Cronbach alpha for the HIV Stigma Scale is 0.96 and the alphas for the subscales ranged from 0.90 to 0.93 (Berger et al., 2001).

### **3.8.6 Self-reported adherence**

The self-reported adherence measure was used to assess adherence (see Appendix C). The measure enquires about the number of dosages missed over a seven day recall period and to explore the barriers to adherence (Morisky, Green, & Levine, 1986).

### **3.8.7 Biological markers**

The following data were obtained from patients' charts: CD4 counts, viral load, frequency of clinic attendance. The viral load values were important for the present study.

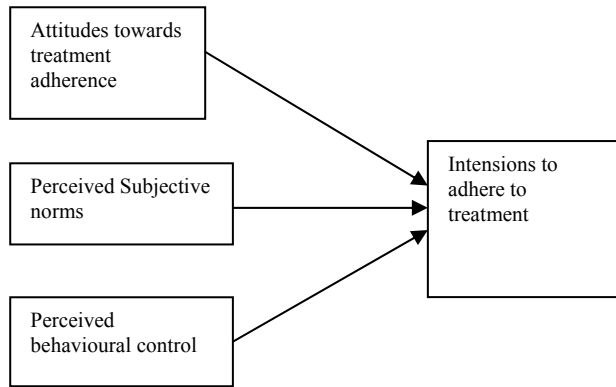
## **3.9 Data Analysis**

All statistical procedures were performed using the Statistical Package for the Social Sciences (SPSS).

Before any inferential statistics were performed, an integrity check of the data was performed. Reverse scoring were performed and an average for the missing values were calculated. Total scores for each variable were computed and the means (M), standard deviations (SD), and ranges were calculated for the various independent variables. Thereafter, the assumptions of parametric statistics were assessed. Univariate normality of the dependent variables was assessed using Kolomogorov-Smirnov test of normality. Furthermore, intercorrelations between the theory of planned behaviour, intentions, adherence and stigma were assessed and summarized in a correlation matrix. Correlations were also calculated between self-reported adherence and the relevant biological marker as obtained from chart review, namely, viral load. Thereafter, multiple regression analyses were performed.

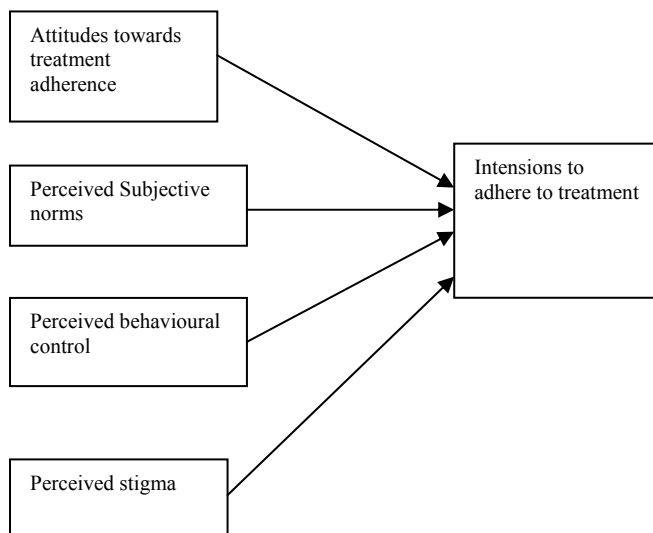
### **3.9.1 Predicting Intentions**

At step 1 in the first linear hierarchical multiple regression analysis (see figure 2), the TPB was tested, in other words, with attitudes towards adherence, subjective norms, and perceived behavioural control as predictor variables, and intentions to adhere to treatment as dependent variable.



*Figure 2: Regression model 1*

At step 2, the predictor variable perceived stigma (see figure 3), as well as the three predictor variables from step 1 was entered into the analysis. Step 2 tested if the additional variable (perceived stigma) improves step 1's prediction of intentions.



*Figure 3: Regression model 2*

### **3.9.2 Relationship between Intentions and Self-reported adherence**

The second model tested the relationship between intentions to adhere to treatment (predictor variable) and self-reported adherence (dependent variable) (see figure 4).



Figure 4: Model 3

### 3.9.3 Predicting Self-reported adherence

At step 1 in the second linear hierarchical multiple regression analysis (see figure 5), attitudes towards treatment adherence, perceived subjective norms and perceived behavioural control as predictor variables were entered into the analysis to assess how much variance the TPB could account for in self-reported treatment adherence as dependent variable.

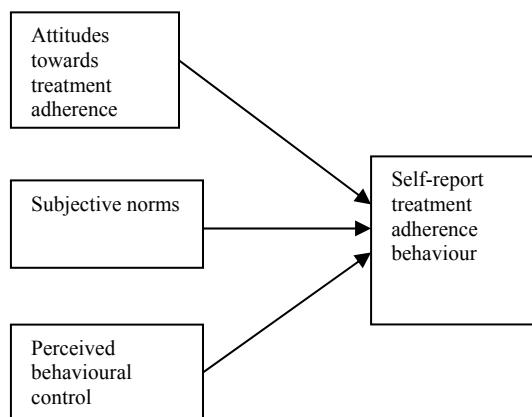


Figure 5: Regression model 4

At step 2, the additional predictor variable of perceived stigma (see figure 6) was entered into the analysis to determine whether or not it improved the step 1's prediction of self-report treatment adherence behaviour (dependent variable).

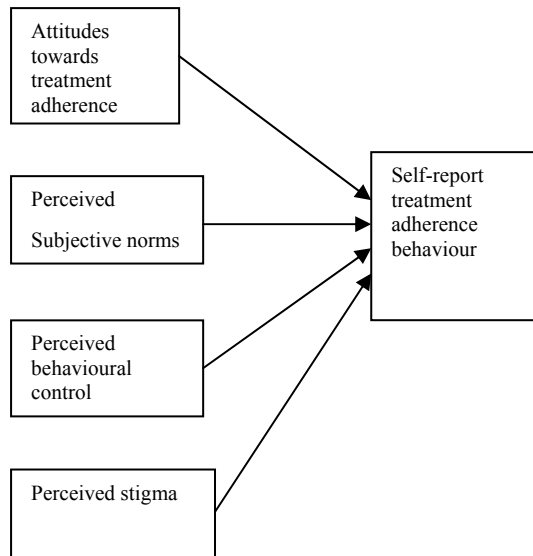


Figure 6: Regression model 5

### 3.9.4 Predicting Viral load

The relationship between self-report treatment adherence and viral load as a biological marker were tested in a linear regression analysis (see figure 7).

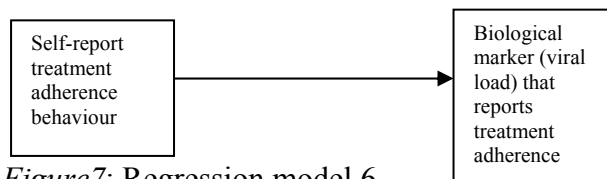


Figure 7: Regression model 6

### 3.10 Inclusion and exclusion criteria for participant selection

The study will recruit patients that were diagnosed with HIV and receive ART medication at the Helderberg Hospital. The patients' ages will be from eighteen and above. The study will not include patients with any other illnesses such as hypertension and diabetes.

### 3.11 Ethical clearance procedures

Ethical clearance was obtained from the Centre for Human Research in Tygerberg in order for the present study to be conducted at the HIV clinic in Helderberg. Ethical clearance from the Department of Health and the Medical Superintendent at HH was obtained to be able to conduct the study at the clinic.



Informed consent was obtained from patients who agree to participate in the study.

### **3.12 Research Hypotheses**

According to the TPB and the research objectives of chapter I, the following hypotheses were developed:

Hypothesis 1: The TPB will be able to predict intentions to adhere to ART among South African patients attending public health clinics.

Hypothesis 2: Perceived stigma will be able to improve the TPB prediction of intentions to adhere to treatment.

Hypothesis 3: There is a significant relationship between intentions to adhere to treatment and self-reported treatment adherence behavior.

Hypothesis 4: The TPB will be able to predict self-reported adherence to ART among South African patients attending public health clinics.

Hypothesis 5: The inclusion of perceived stigma will improve the prediction of self-reported treatment adherence behavior.

Hypothesis 6: There will be a significant relationship between self-reported treatment adherence behavior and viral load.

## Chapter 4

### Results

#### 4.1 Demographic characteristics of the sample

The majority of the participants were female (82.2%), single (45%), black (66.3%), unemployed (42.6%), reported an annual family income of less than R10 000 (41.7%) and lived with other adults and children (42.4%). Of the participants who had completed matric (23%) only 3% had graduated from a tertiary institution. The average age of the sample was 35 years (SD: 7.05; range: 20 to 51 years). These results are summarised in Table 1.

Table 1

*Demographic characteristics of the sample*

	N	(%)	M
Age	101		35.04
Gender	101		
Male	18	17.80	
Female	83	82.20	
Race	101		
African	67	66.30	
Coloured	32	31.70	
Other	2	2.00	
Marital status	100		
Single	45	45.00	
Widowed	11	11.00	
Separated	6	6.00	
Divorced	9	9.00	
Married/living together	29	29.00	

	N	(%)
Living situation	99	
Live alone	14	14.10
Live with other adult(s), no children	16	16.20
Live with other adult(s) and children	42	42.40
Live with children	26	26.30
Live in a institution or retirement home	1	1.00
Highest level of education	100	
No formal education	8	8.00
Completed primary school	17	17.00
Attended high school but did not complete matric	43	43.00
Completed matric	23	23.00
Attended university/colleg e but did not graduate	6	6.00
Graduated from univ/college	3	3.00

	N	(%)
Current work situation	101	
Employed full time	29	28.70
Employed part time	17	16.80
Student	4	4.00
Unemployment	43	42.60
Disabled	4	4.00
Homemaker	4	4.00
Annual family income	96	
Less than R 10 000	40	41.70
R 10 001-R 40 000	16	16.70
R 40 001-R 80 000	3	3.10
R 80 001-R110 000	1	1.00
R 170 001-R 240 000	1	1.00
R 240 000 and above	1	1.00
Don't know	34	35.40
Place of birth	100	
Town	53	53.00
City	36	36.00
Farm	11	11.00

## 4.2 Tests of parametric assumptions

Univariate normality was assessed using the Kolomogorov- Smirnov test of normality. Results indicate that the independent variable Perceived stigma was non-significant,  $D(74) = 0.07, p > 0.05$ , which tells us that the distribution of the sample was not significantly different from a normal distribution. The rest of the independent variables were not normally distributed since  $p < 0.05$ . According to Field (2000), possible causes of non-normality include data capturing errors and non-declared missing values. However, an integrity check of the data revealed no such errors.

Base 10 logarithmic and square root transformations were performed in an attempt to normalise the skewed distributions, but the Kolomogorov- Smirnov test delivered significant results.

Correlations between predictor variables were assessed to check whether there was collinearity in the data. Correlations with a magnitude of  $r > 0.80$  between predictors can be considered as very problematic, whereas a Variance Inflation Factor (VIF) value exceeding 10 may be regarded as cause for concern (Field, 2000). Correlations of this magnitude were not within the data and no VIF exceeded 10, therefore no significant multi-collinearity is present.

To test for assumption of independence of errors, Durban-Watson test statistics were computed for all regression analyses. The computed values were greater than or equal to 1 and less than or equal to 3 ( $1 \leq x \leq 3$ ), which indicates independence of errors (Field, 2000). The variables in this study were not inter-correlated (Brace, Kemp & Snelgar, 2003).

Table 2

*Normality Tests for Dependent variables*

Variable	Kolmogorov-Smirnov		
	Statistic	df	p
Attitude towards adherence	.18	74	.00**
Perceived subjective norms	.13	74	.00**
Perceived behavioural control	.33	74	.00**
Perceived stigma	.07	74	.20

\*\*  $p < .01$

### 4.3 Internal consistency of measurement instruments of the present study

Cronbach alpha reliability coefficient measures the internal consistency of the different measurements. A Cronbach alpha  $> 0.70$  shows internal consistency (Field, 2000). These results are summarized in Table 3.

#### 4.3.1 Self-reported adherence

A Cronbach alpha reliability coefficient revealed that the measure of self-reported adherence had modest internal consistency ( $\alpha = 0.56$ ). The internal consistency improved ( $\alpha = 0.59$ ) once the following items were removed from the analysis: Forgot to take medication during the last two weeks, Forgot to take medication over the weekend. The internal consistency could not be improved any further.

Table 3

*Cronbach's alpha of the measures*

Variable	Cronbach's alpha
Intentions	.94
Attitudes towards treatment	.86
Perceived subjective norms	.75
Perceived behavioural control	.81
Perceived stigma	.93
Self-reported adherence	.59

#### **4.4 Descriptive statistic of the sample**

Descriptive statistic was calculated for the variables of the theory of planned behaviour and perceived stigma. These results are given in table 4

Table 4

*Descriptive statistics characterizing Theory of Planned behaviour and perceived stigma*

	N	M	SD	Range
Attitude towards adherence	95	38.42	9.55	14-51
Perceived subjective norms	96	23.22	4.86	9-32
Perceived behavioural control	98	22.52	2.57	8-24
Intentions	99	21.49	3.51	8-24
Perceived stigma	84	90.78	20.34	46-153
Self-report adherence	101	3.61	.93	0-4

#### **4.5 Correlation matrix of the predictor variables and the dependent variables**

Table 5 indicates Pearson's correlation matrix for the predictor variables and the dependent variables. The variables, which showed significant correlations with intentions, were attitudes towards treatment adherence ( $r = 0.21, p < 0.05$ ), perceived behavioural control ( $r = 0.35, p < 0.01$ ) and perceived stigma ( $r = -0.24, p < 0.05$ ). Perceived subjective norms, on the other hand was not significantly correlated with



intentions to adhere to treatment adherence ( $r = 0.15, p > 0.05$ ). No significant correlations were found between self-reported adherence and perceived subjective norms ( $r = 0.03, p > 0.05$ ), between self-reported adherence and perceived behavioural control ( $r = 0.09, p > 0.05$ ), or between self-reported adherence and perceived stigma ( $r = -0.05, p > 0.05$ ).

Table 5

*Correlation Matrix of Intentions to adhere to treatment and self-reported adherence*

	Intentions	Attitudes towards adherence	PSN	PBC	PSTIG	Self- report adherence
Intentions	1					
Attitudes towards adherence	.21*	1				
PSN	.15	.05	1			
PBC	.35**	.28**	.14	1		
PSTIG	-.24*	.01	.11	-.30**	1	
Self-report adherence	-.05	.21*	.03	.09	-.05	1

\*Correlation is significant at the 0.05 level (two tailed)

\*\*Correlation is significant at the 0.01 level (two tailed)

#### 4.6 Predicting intentions

Table 6 shows the different summary statistic R, R square ( $R^2$ ), changed R square ( $\Delta R^2$ ), standard error, F statistic (F), degrees of freedom (df1 and df2) and the significance of F (p).

Table 6

*Summary of Hierarchical multiple regression analysis for variables predicting intentions to adhere to treatment (Regression model 1 and 2)*

Block	R	R <sup>2</sup>	$\Delta R^2$	Std error	F	df1	df2	p
A	0.35	0.12	0.12	3.31	4.52	3	97	0.01
B	0.39	0.15	0.03	3.27	3.09	1	96	0.08

- A. Predictors: (Constant), Attitudes towards treatment adherence, Subjective norms, Perceived behavioural control
- B. Predictors: (Constant), Attitudes towards treatment adherence, Perceived subjective norms, Perceived behavioural control, Perceived stigma
- C. Dependent variable: Intentions to adhere to treatment

In the first hierarchical multiple regression analysis (see table 6), attitudes towards adherence, perceived subjective norms and perceived behavioural control were entered together in the first step in block A. The linear combination of these variables could significantly account for 12% ( $R^2 = 0.12$ ) of the variance in intentions to adhere to treatment,  $F(3, 97) = 4.52, p = 0.01$ .

The second step (block B), including the four predictor variables explained 15% of the variance in intentions to adhere to treatment. However, there was only a 3% increase in explained variance, which was not significant,  $F(1, 96) = 3.09, p = .08$ .

Table 7 shows the model parameters for both steps in the hierarchy. The collinearity statistics indicates no multi-collinearity.

Table 7

Parameters for variables predicting intentions to adhere to treatment ( $N = 101$ )

Model	Unstandardized		Standardized Beta coefficients	t	Sig.	95% CI		Collinearity statistics	
	B	Std. error				LL	UL	Tolerance	VIF
1 Attitudes <sup>b</sup>	.05	.04	.12	1.24	.27	-.03	.12	.92	1.08
PSN <sup>c</sup>	.08	.07	.11	1.13	.26	-.06	.22	.98	1.02
PBC <sup>d</sup>	.36	.14	.26	2.63	.01	.09	.63	.91	1.10
2 Attitudes <sup>b</sup>	.05	.04	.14	1.40	.17	-.02	.12	.92	1.09
PSN <sup>c</sup>	.10	.07	.13	1.40	.17	-.04	.24	.96	1.04
PBC <sup>d</sup>	.29	.14	.21	2.01	.05	.004	.57	.83	1.21
PSTIG <sup>e</sup>	-.03	.02	-.17	-1.76	.08	-.07	.004	.90	1.11

Note. CI = confidence interval; LL = lower limit, UL = upper limit.

- a. Dependent variable: Intentions to adhere to treatment
- b. Attitudes towards treatment adherence
- c. Perceived subjective norms
- d. Perceived behavioural control
- e. Perceived stigma

In the first step of the hierarchy (see table 7), only perceived behavioural control in the linear combination of the variables of TPB was significant in predicting intentions to adhere to adherence,  $\beta = 0.26$ ,  $t(101) = 2.63$ ,  $p < 0.05$  ( $b = 0.36$ ). In the second step, attitudes towards treatment adherence had a coefficient of 0.05 (standardised  $\beta$  coefficient = 0.14), with a  $t$  value of ( $t(110) = 1.40$ ,  $p > 0.05$ ). This  $t$  value was non-significant, in other words the variable does not play a significant role to predict intentions with the TPB. The confidence interval,  $CI(-0.02, 0.12)$ , confirms that the variable was not significant in the regression model.

Subjective norms formed a coefficient of 0.10 (standardised  $\beta$ -coefficient = 0.13) and a  $t$  value of ( $t(101) = 1.40$ ,  $p > 0.05$ ). This  $t$  value was non-significant. The confidence interval,  $CI(-0.04, 0.24)$ , suggest that the variable, subjective norm, is not significant in the regression model.

Perceived behavioural control had a coefficient of -0.03 (standardised  $\beta$  coefficient = 0.21), with a  $t$  value of ( $t(101) = 2.01$ ,  $p < 0.05$ ). This  $t$  value was significant, in other word the variable had a great influence on intentions to adhere to treatment. The confidence interval,  $CI(0.004, 0.57)$ , confirms that perceived behavioural control is not significant in the regressionmodel.

Perceived stigma had a coefficient of 0.29 (standardised  $\beta$  coefficient = -0.17), with a  $t$  value of ( $t(101) = -1.76$ ,  $p > 0.05$ ). This  $t$  value was non-significant, in other word the variable had a non-significant impact on intentions to adhere to treatment.

Perceived behavioural control was the only significant variable for the prediction of intentions to adhere to treatment. Perceived stigma did not contribute to better the prediction of intentions to adhere to treatment.

#### 4.7 Bivariate correlation between intentions and self-reported adherence

Table 8 shows Pearson's correlation for the predictor variable, intentions to adhere to treatment, and the outcome variable, self-reported treatment adherence behaviour. Intentions to adhere to treatment had a negative non-significant correlation with self-reported treatment adherence ( $r = -0.05, p > 0.05$ ).

Table 8

*Bivariate correlation of intentions to adhere to treatment and self-reported treatment adherence behaviour (N = 101)*

	Intentions	Behaviour
Intentions	1	
Behaviour	-0.05	1

\*. Correlation is significant at the 0.05 level

- a. Intentions to adhere to treatment
- b. Self-reported treatment adherence behaviour

#### 4.8 Predicting self-reported treatment adherence

In table 9, block A and B showed the hierarchical summary statistics as different variables were incorporated within the regression model.

Table 9

*Summary of Hierarchical multiple regression analysis for variables predicting self-reported adherence (regression model 5 and 6) (N = 101)*

Block	R	R <sup>2</sup>	ΔR <sup>2</sup>	Std error	F	df1	df2	p
A	.21	.04	.04	.92	1.49	3	97	.22
B	.21	.04	.001	.92	.15	1	96	.70

A. Predictors: (Constant), Attitudes towards treatment adherence, Subjective norms, Perceived behavioural control

B. Predictors: (Constant), Attitudes towards treatment adherence, Perceived subjective norms, Perceived behavioural control, Perceived stigma

C. Dependent variable: Self-reported treatment adherence behaviour

In the second hierarchical multiple regression analysis (see table 9), attitudes towards treatment adherence, perceived subjective norms, and perceived behavioural control were entered together in the first step but could not explain significant variance in self-reported adherence,  $F(3, 97) = 1.49, p = 0.22$ . Perceived stigma was entered in the second step and failed to explain significant variance in self-reported adherence,  $F(1, 96) = 0.15, p = 0.70$ .

Table 10 shows the model parameters for both steps in the hierarchical multiple regression analysis. According to the table all the variables had high tolerance values, thus no correlations between the predictor variables were found (Field, 2000).

Table 10

*Parameters of the variables predicting self-reported adherence*

Model	Unstandardized		Standardized Beta coefficients	t	Sig.	95% CI		Collinearity statistics	
	B	Std. error				LL	UL	Tolerance	VIF
1 Attitudes <sup>b</sup>	.02	.01	.19	1.20	.06	-.001	.04	.92	1.08
PSN <sup>c</sup>	.003	.02	.01	.13	.90	-.03	.04	.98	1.02
PBC <sup>d</sup>	.013	.04	.03	.34	.73	-.06	.09	.91	1.10
2 Attitudes <sup>b</sup>	.02	.01	.20	1.91	.05	-.001	.04	.92	1.09
PSN <sup>c</sup>	.004	.02	.02	.19	.85	-.03	.04	.96	1.04
PBC <sup>d</sup>	.008	.04	.02	.21	.84	-.07	.09	.83	1.21
PSTIG <sup>e</sup>	-.002	.005	-.04	-.39	.70	-.01	.008	.90	1.11

*Note.* CI = confidence interval; *LL* = lower limit, *UL* = upper limit.

- a. Dependent variable: Self-reported adherence
- b. Attitudes towards treatment adherence
- c. Perceived subjective norms
- d. Perceived behavioural control
- e. Perceived stigma

In the first step of the hierarchy, the linear combination of the variables of the TPB (attitudes towards adherence, perceived subjective norms and perceived behavioural control), did not make a significant contribution in predicting self-reported adherence. In the second step, attitudes towards treatment adherence had a coefficient of 0.02 (standardised Beta coefficient = 0.20), with a t value of  $t(101) = 1.91$ ,  $p = 0.05$ . The t value is not significant, in other words the variable did not have an effect on self-reported adherence.

Perceived subjective norms,  $\beta = 0.02$ ,  $t(101) = 0.19$ ,  $p > 0.05$ , did not add value to the self-report treatment adherence behaviour. The confidence interval,  $CI(-0.03, 0.04)$ , included null, indicating that the variable was not significant in the regression model.

Perceived Behavioural control,  $\beta = 0.02$ ,  $t(101) = 0.21$ ,  $p > 0.05$ , did not have an effect on self-reported adherence. The confidence interval,  $CI(-0.07, 0.09)$ , indicates that perceived behavioural control was not significant in the regression model.

The inclusion of perceived stigma,  $\beta = -0.04$ ,  $t(101) = -0.39$ ,  $p > 0.05$ , did not improve the prediction of self-report treatment adherence behaviour. The confidence interval,  $CI(-0.01, 0.008)$  confirms that perceived stigma was not significant in predicting self-reported treatment adherence.

The TPB (attitudes towards treatment, perceived subjective norms and perceived behavioural control) did not contribute significantly to the prediction of self-report treatment adherence behaviour. The inclusion of perceived stigma did not improve the prediction of self-report treatment adherence behaviour.



#### 4.9 Bivariate correlation between self-reported adherence and viral load

Table 11 shows the Pearson correlation for the predictor variable, self-report treatment adherence behaviour, and the outcome variable, biological marker (viral load) of treatment adherence. Self-report treatment adherence behaviour had a significant correlation of -0.38 ( $p < 0.05$ ) with the biological marker (viral load) of treatment adherence behaviour.

Table 11

*Bivariate correlation of self-reported treatment adherence and viral load (N = 101)*

	Behaviour <sup>a</sup>	Viral load <sup>b</sup>
Behaviour <sup>a</sup>	1	
Viral load	-0.38*	1

\*. Correlation is significant at the 0.05 level

a. Self-report treatment adherence behaviour

b. Biological marker: Viral load (obtained in the last six months)

Although self-reported adherence had a significant negative correlation with viral load (Obtained in the last six months), this correlation coefficient is small.

## Chapter 5

### Discussion and Conclusion

#### 5.1 Predicting intentions to adhere to treatment

The first objective of the study was to determine the extent to which the linear combination of the TPB variables predicted adherence to ART. According to the TPB as applied to adherence, intentions to adhere to ART treatment is influenced by three components, namely, attitudes towards treatment adherence, perceived subjective norms and perceived behavioural control (Ogden, 2000).

In the present study, I found that attitudes towards adherence and perceived behavioural control were significantly correlated with intentions to adhere to treatment. Perceived subjective norms, on the other hand, were not significantly correlated with intentions. Thus, similar to findings by Armitage and Connor (2001), perceived subjective norms was found to be a weak predictor of intentions (see also Sparks, Shepherd, Wieringa, & Zimmermans. 1995; Sheppard et al., 1988; Van den Putte, 1991). My study is a continuation of the literature that examines the relevance or applicability of the TPB in understanding adherence to medication.

In the present sample, in step one of the hierarchical regression, the TPB was able to explain 12% of the variance in intentions to adhere to treatment. According to Cohen (1988), this represents a medium effect size for multivariate models. Perceived behavioural control was the only variable that significantly predicted adherence intentions, whereas attitudes towards treatment and perceived subjective norms were non-significant predictors to intentions to adhere to treatment. This finding indicates that patients, who feel confident that they can successfully undertake their prescribed regimen, will be more likely to have strong intentions to adhere to treatment. This finding is consistent with other research showing that perceived behavioural control is

strongly related to intentions to adhere to treatment (e.g. Armitage and Connor, 2001, Fincham et al., 2008).

A possible reason for attitudes towards treatment not contributing in explaining variance in intentions is that not all four subscales were used in the analysis of this variable. Preliminary, all four subscales were subjected to a reliability analysis which yielded that only two subscales, namely commitment to adherence and patient-provider communication, really measured attitudes towards ART adherence in the context of the present study. This finding was in accordance with Lewis and Abel (2002) whom stated that commitment to adherence is similar to intentions. Furthermore, commitment to adherence and patient-provider communication were positively correlated which construed that the relationship between the patient and the health care provider affects the patient's commitment to adherence (DiMatteo, 1998). However, if inclusion of all four subscales were evident, the patient might have shown a positive attitude towards adhering to treatment regimens.

A possible reason for perceived subjective norms not yielding any significant contribution in explaining variance in intentions to adhere to ART, may be that the patients do not know what others are doing in terms of taking their medication. They also may not be discussing their ART treatment with others and hence do not know whether the significant others approve or disapprove of their treatment behavior.

Yet, when perceived stigma was added to the TPB, it also did not emerge as a significant predictor of adherence, suggesting that the TPB may be sufficient in predicting behavioural intentions. Although perceived stigma did not predict adherence, a significant negative correlation between perceived stigma and intentions was observed. This finding coincides with results in the literature that reported that perceived stigma was inversely associated with adherence in different countries, for

example, United States of America, the United Kingdom, and Peru (Roberts, 2005; Stirratt et al., 2006; Ware et al., 2006; Calin et al., 2007; Melchoir, Nemis, Alencar and Buchalia, 2007).

## **5.2 The relationship between intentions and self-reported treatment adherence**

Despite the fact that in previous research the TPB has been shown to predict a relationship between intentions and self-reported treatment adherence (O'Boyle et al., 2001), this was not found in the present study. Instead I found that no significant relationship existed between intentions and self-reported adherence. Therefore, the correlation between intentions and self-reported adherence cannot be extrapolated to other populations.

A possible reason for not finding a significant correlation may be that while some participants completed their battery of questionnaires independently, other participants had their battery of questionnaires read to them. Their responses were ticked off by the researcher which may have resulted in response bias due to social desirability responding. In other words, many participants in the current sample would simply state what they believe the researcher wants to hear, for example, that they have been perfectly adherent. If these participants were honest in answering the questionnaires more significant correlations might have been provided.

## **5.3 Predicting self-reported treatment adherence**

According to the literature, attitudes towards treatment adherence, subjective norms and perceived behavioural control do predict treatment adherence behaviour (Rhodes & Courneya, 2004). When the variables of the TPB were entered into a hierarchical regression model, none of the variables were able to explain variance in

self-reported treatment adherence. The inclusion of perceived stigma did not significantly improve the TPB's prediction of self-reported adherence.

A possible explanation for these results could be that the self-reported adherence measure had suboptimal reliability. In the present sample the self-reported adherence questionnaire had an internal consistency of 0.59 which did not meet the criterion of 0.70 as recommended by Field (2000). After the necessary items were deleted from the questionnaire, the internal consistency could still not be improved. In the final analysis only two items were used to measure self-reported adherence. For this reason it can be concluded that self-reported adherence over-estimated adherence to ART which can be due to misinterpretation of the questions on the questionnaire, misunderstanding of the questions, or that the participants answered the questions hastily.

#### **5.4 The association between self-reported adherence and viral load (biological marker)**

There are some studies that showed an association between self-reported adherence and viral load (Arnsten et al., 2001; Bangsberg et al., 2000). A study conducted by Bangsberg et al. (2000) found a strong positive correlation between self-reported adherence and HIV-1 viral load, whereas I have found an inverse association. Bangsberg et al. (2000) measured adherence with the use of four measurements, namely a three day self-report, three day electronically monitored doses, pill count and the percentage of doses taken (Bangsberg et al., 2000). They particularly looked at the percentage level of prescribed doses taken with a recall period of three days. I found a significant negative relationship between self-reported adherence and viral load. The differences in assessing self-reported adherence might have contributed to the present study yielding an inverse relationship. Preliminary, the

percentage doses taken over 7 days in the present study covariate with the other items in the self-reported adherence measure, which violated the assumption of reliability (results not shown).

### **5.5 Implications of the study**

The findings of the present study suggest that interventions aimed at improving adherence to ART amongst HIV patients attending public health clinics should employ techniques in enhancing perceived behavioural control. Perceived behavioral control can be enhanced by dividing it into self-efficacy and perceived control over behaviour as suggested by several studies (e.g. Ajzen, 2001; Armitage & Connor, 1999). A further aim should be to increase the patients' perceptions of their efficacy to be adherent and also to minimize their perceived stigma. These improvements can result in fewer incidences of treatment complications and also an increase in adherence to ART. The benefits that may result from an increase in adherence to ART are, for example, an increase in the quality of life for HIV-positive patients, lower rates of opportunistic infections, less fatigue, and lower risk of the need to switch to second line treatment.

### **5.6 Limitations of the study**

Firstly, during the data collection procedure the patients might have felt rushed in completing the battery of questionnaires because they could be called for their doctor's consultation at any moment. As a result, the patients might not have adequately completed the questionnaires submitting it with missing data. I was unable to ask these patients to fill in the missing data because they would leave while I was busy with other participants.

A second limitation of the study may be that the participants experienced fatigue because of the duration (one hour) of the battery of questionnaires. As a result the participants might not have completed the questionnaires adequately.

Thirdly, the present study was conducted with a sample recruited from only one clinic with a select group of patients that came to the clinic adherent to care. Consequently, the results may not be generalizable to other populations of patients in South Africa.

A fourth limitation may be that gender bias have influenced the results as more women than men participated in this study. For future studies equal gender representations should be considered in order for gender-based comparisons to be made when examining the TPB (Blancherd et al., 2002).

A further limitation was that the TPB did not take into account factors such as the patients' personality and also demographic considerations were not taken into account. A person's unconscious motive was also not taken into account, thus it only focus on the individual's rational decision making processes (Ogden, 2000). Adherence therefore is assumed to result from a rational weighing of the costs and benefits of adherence. Furthermore, the person's affective reactions were also not addressed, for instance the effect of mental health on their behaviour (van der Pligt, & de Vries, 1998). This could be an important factor as Kagee and Nel (2010) recently concluded that a person's mental health is part of various barriers to optimal ART adherence.

## **5.7 Recommendations for future studies**

Future studies in developing appropriate methods in measuring adherence are necessary in an attempt to design culturally appropriate interventions to improve adherence. The methodological problems noted in the present study need to be

addressed. One of these problems may be large variation resulting from a limited sample size which could be improved by increasing the sample size. Further, future studies should also attempt to control for social desirability within South African samples attending public health clinics.

The TPB variables' inability to explain variation in treatment adherence behaviour could be indicative of the inadequacy of the theory as indicated by other researchers (for example, Conner & Armitage, 1998; Landridge et al., 2007; Rhodes & Courneya, 2004). It can be useful to add other variables to the TPB attitudes towards treatment, perceived subjective norms and perceived behavioural control. For example, the affective influences upon behaviour should be included in the theory (van der Pligt, & de Vries, 1998).

In conclusion, the present study supports the use of the TPB in the prediction of intentions to adhere to ART within a South African sample attending public health clinics. Perceived behavioural control was the only variable that significantly predicted intentions to adhere to ART. This finding suggests that interventions should be directed at perceived behavioural control in enhancing people's adherence to ART. Furthermore, perceived stigma was not a useful addition to the model.

The results did not show a statistically significant relationship between intentions and self-reported adherence. The linear combination of the three variables that constitute the TPB did not predict self-reported adherence. The inclusion of perceived stigma in the second step did not improve the prediction of self-reported adherence to ART. Furthermore, it was found that self-reported adherence significantly correlated with viral load, which suggests that viral load in the patients' blood stream will be suppressed when they become more adherent.



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**APPENDIX A****STELLENBOSCH UNIVERSITY**

Principal Investigators: Wylene Saal and Adriaan Nel

Department of Psychology

Telephone Number: 078 118 1402

**CONSENT FORM****The applicability of the Theory of Planned Behaviour in predicting adherence to ART among a South African sample****Invitation to participate**

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Committee for Human Research at Stellenbosch University and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.



**What is this research study all about?**

The study is about how people adhere to their antiretroviral medication. We would like to find out how certain factors influence adherence, for example, your attitudes towards the medicine, what you think others think of you, what you think about how others take their medicine, and how you think of yourself as being competent to take your medicine.

As a participant, you will be asked to answer some questions presented in the form of a questionnaire about your illness, treatment, and how you think about your medicine.

**Why have you been invited to participate?**

You are being asked to participate in this study because you have been identified as being diagnosed with HIV. Patients with this condition are the focus of this study.

**What will your responsibilities be?**

Upon participation your responsibilities will be to give your consent that you will take part in this study. After consent has been given, you then will have to fill out a questionnaire packet. Participation in this study is entirely voluntary and you can refuse participation. You may stop participation at any time without prejudice or without jeopardizing the care either of yourself or any family members; you may request that any information already given not to be used. You are encouraged to ask questions concerning the study at any time as they occur to you during the study.

**Will you benefit from taking part in this research?**

There is no guarantee that you will benefit directly from this research study. However, the researcher believes that it is important to understand the reasons why a person will not take their antiretroviral medication. If this study is successful then the information can be used to improve antiretroviral treatment.

**Are there risks involved in your taking part in this research?**

Some of the questions on the questionnaires used in this study may touch on sensitive areas. However, every effort will be made by the researcher to minimize your discomfort in any way possible. You are encouraged to discuss any negative feelings or experiences you have as a result participating in this research study with the researchers. If at any time you feel like stopping to take part in this research study you may do so.

**If you do not agree to take part, what alternatives do you have?**

Participating in this study is completely voluntary and you are free to choose not to participate.

**Who will have access to your medical records?**

Every attempt will be made by the researcher to keep any information collected in this study confidential, except as by required by court order or by law. If any publication results from this research, you will not be identified by name. In fact any information will only be viewed by the principal investigator and her supervisor.

**Will you be paid to take part in this study and are there any costs involved?**

No you will not be paid to take part in the study. There will be no costs involved for you, if you do take par

Is there anything else that you should know or do?

- You can contact ..... at tel. .... if you have any further queries or encounter any problems.
- You can contact the Committee for Human Research at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

- You will receive a copy of this information and consent form for your own records.

**Declaration by participant**

By signing below, I ..... agree to take part in a research study entitled (*insert title of study*).

**I declare that:**

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) .....  
2009.

.....  
Signature of participant

.....  
Signature of witness

**Declaration by investigator**

I (*name*) ..... declare that:

- I explained the information in this document to  
.....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) ..... on (*date*) .....

2009.

.....

Signature of investigator

.....

Signature of witness



## 8. LIVING SITUATION:

- Live alone
- Live with other adults(s), no children
- Live with other adults and children
- Live with children
- Live in an institution or retirement home

## 9. WHAT IS THE HIGHEST EDUCATION LEVEL YOU HAVE COMPLETED?

- No formal education
- Completed primary school
- Attended high school but did not complete matric
- Completed matric
- Attended university, college or technikon but did not graduate
- Graduated from university, college or technikon

## 10. WHAT IS YOUR CURRENT WORK SITUATION?

- Employed full time
- Employed part time
- Student
- Unemployment
- Disabled
- Homemaker
- Retired

## 11. WHICH OF THE FOLLOWING BEST DESCRIBES YOUR APPROXIMATE ANNUAL FAMILY INCOME FROM ALL SOURCES, BEFORE TAXES?

- Less than R10 000
- R10 001-R40 000
- R40 001-R80 000
- R80 001-R110 000
- R110 001-R170 000
- R170 001-R240 000
- R240 001 and above
- Don't know

12. WHERE WERE YOU BORN?

Town

City

Farm

13. WHAT IS YOUR FIRST LANGUAGE?

\_\_\_\_\_

14. WHICH OTHER LANGUAGES DO YOU SPEAK?

\_\_\_\_\_

### APPENDIX C

Many patients find it difficult to take their HIV medications exactly as prescribed.

Please answer the following questions related to your HIV medication.

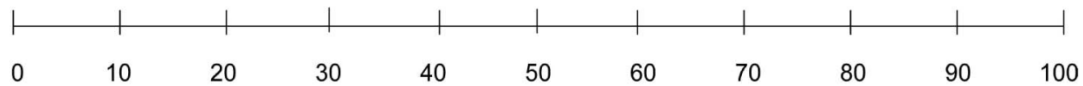
How many doses of your HIV medication did you miss in the last 7 days?

Put a mark (X) on the line below at the point that shows your best guess about how much of your prescribed HIV medication you have taken in the last month.

Examples:      0% means you have taken no medication

50% means you have taken half your medication

100% means you have taken every single dose of your medication



Please circle your response for each of the following 4 questions:

During the last two weeks, did you forget to take your HIV medications?

YES       NO

When you feel better, do you sometimes stop taking your HIV medications?

ALWAYS       SOMETIMES       NEVER

Sometimes if you feel worse, do you stop taking your HIV medications?



ALWAYS       SOMETIMES       NEVER

Did you forget to take any of your HIV medications over the past weekend?

YES       NO

### APPENDIX D

Below are statements relating to how you take your medication. It is not a test, so there is no right or wrong answers. Answer each item as carefully and as accurately as you can by placing a (X) in the appropriate box.

	Never	Sometimes	Most of the time	Always
1. In the afternoon, I have a hard time remembering if I took my early dose of medication.				
2. I have forgotten whether I have taken my medication, even while I am in the middle of doing it.				
3. I often have trouble remembering to get refills for my medication on time.				
4. I forget to talk to my medical provider about side effects of my medication.				
5. Even though I want to take my medication, I just forget to take it.				
6. I lose track of time, and I have to take my medication late or not at all.				
7. I have a hard time remembering to take my medications with me when I leave home.				
8. My doctor/ nurse make sure that I have a plan for fitting the medication dosing schedule into my personal routine.				
9. My doctor/ nurse want me to participate in making decisions about my medicine.				
10. My doctor/ nurse understand how difficult it is to follow my medication regimen.				
11. My doctor/ nurse understand my personal life and why it is hard for me to take my medications.				
12. My doctor/ nurse understand my personal life and why it is hard for me to take my medications.				
13. My doctor/ nurse make time for me to ask all the questions I need about my medications.				
14. My doctor/ nurse ask me if I can handle any possible side effects of my medication.				
15. I fear that I am not capable of taking my medications as I should.				
16. I worry that I will not be able to keep making the effort to take this medicine forever.				

17. No matter how hard I try, I don't think I'll be able to follow the medication plan.				
18. I find it nearly impossible to follow the food restrictions with my medications.				
19. I have trouble taking my medications on time.				
20. In the past I have had trouble taking medication when I had no physical symptoms.				
21. Things get in the way of my taking my medication as prescribed.				
22. I am determined to do whatever it takes to take my medication on schedule.				
23. I follow all the food restrictions that come with my medication no matter how hard it is.				
24. I am determined to take my medications even if there is no way to have privacy (i.e. in front of friends, family and/or co-workers).				
25. I take my medication even if I don't feel well.				
26. I am determined to stick with a plan to help me remember to take my medication as prescribed.				
27. I learn as much as I can about my medications so I can take them exactly as prescribed.				
28. I am committed to taking my medication even if tastes bad or is hard to swallow.				

29. Have you taken all of your medication as prescribed so far today?	Yes	No	Cannot remember	So far as I can remember
30. Did you take all of your medication as prescribed yesterday?	Yes	No	Cannot remember	So far as I can remember
31. Did you take all of your medication as prescribed the day before yesterday?	Yes	No	Cannot remember	So far as I can remember
32. Did you follow all food restrictions so far today?	Yes	No	Cannot remember	So far as I can remember
33. Did you follow all food restrictions yesterday?	Yes	No	Cannot remember	So far as I can remember
34. Did you follow all food restrictions the day before yesterday?	Yes	No	Cannot remember	So far as I can remember

### APPENDIX E

Please answer all the items below by making a cross (X) in the appropriate block.

Please answer all the questions. Choose only ONE answer for each question.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. People with the same condition as I take their medication on time every time.				
2. Friends that I respect think I should take my medication on time every time.				
3. I feel I am letting people down when I avoid taking my medication.				
4. My doctor makes me feel guilty when I do not take my medication regularly.				
5. I feel pressured by the nurses who care for me to take my medication.				
6. The special person in my life gets upset when I do not take my medication.				
7. If other patients at the clinic were to find out that I do not take my medication regularly, this would make me feel guilty.				
8. My family gets annoyed with me when I do not take my medication.				

### APPENDIX F

The following is a list of activities. Please use an (X) to rate each activity in terms of how confident you are that you can do them as of now.

	Cannot do it	Slightly sure I can do it	Sure I can do it
1. Attend all clinic appointments over the next six months.			
2. Collect all my medication from the clinic pharmacy over the next six months.			
3. Make sure I have enough money for transport to the clinic over the next six months.			
4. Make sure I have food to eat when I take my medication over the next six months.			
5. Make sure I do not drink alcohol excessively over the next six months.			
6. Make sure I do not forget to take my medication on time over the next six months.			
7. Make sure I take my medication in the prescribed doses over the next six months.			
8. Make sure I have taken all my medication over the next six months.			

### APPENDIX G

The following is a list of activities. Please indicate the extent to which you intend to do each activity in the next six months.

	I do not intend to do it	I will probably do it	I intend to do it
1. Attend all clinic appointments over the next six months.			
2. Collect all my medication from the clinic pharmacy over the next six months.			
3. Make sure I have enough money for transport to the clinic over the next six months.			
4. Make sure I have food to eat when I take my medication over the next six months.			
5. Make sure I do not drink alcohol excessively over the next six months.			
6. Make sure I do not forget to take my medication on time over the next six months.			
7. Make sure I take my medication in the prescribed doses over the next six months.			
8. Make sure I have taken all my medication over the next six months.			

### APPENDIX H

This study asks about some of the social and emotional aspects of having HIV. Please answer by putting the cross (x) in the block that best describes your feelings. There is no right or wrong answer. This first set of questions asks about some of your experiences, feelings, and opinions about living with HIV. Please answer each question.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. In many areas in my life, no one knows that I have HIV				
2. I feel guilty because I have HIV				
3. People's attitudes towards HIV make me feel worse about myself				
4. Telling someone I have HIV is risky.				
5. People with HIV lose their jobs when their employers find out.				
6. I worked hard to keep my HIV a secret.				
7. I feel I am not as good a person as others because I have HIV.				
8. I never feel ashamed of having HIV.				
9. People with HIV are treated like outcasts.				
10. Most people believe that a person who has HIV is dirty.				
11. It is easier to avoid new friendships than worry about telling someone that I have HIV.				
12. Having HIV makes me feel unclean.				
13. Since learning I have HIV, I feel set apart and isolated from the rest of the world.				
14. Most people think that a person with HIV is disgusting.				
15. Having HIV makes me feel that I'm a bad person.				
16. Most people with HIV are rejected when others find out.				
17. I am very careful who I tell that I have HIV.				
18. Some people who know I have HIV have grown more distant.				
19. Since learning I have HIV, I worry about people discriminating against me.				
20. Most people are uncomfortable around someone with HIV.				
21. I never feel the need to hide the fact that I have HIV.				
22. I worry that people may judge me when				

they learn I have HIV.				
23. Having HIV in my body is disgusting to me.				

Many of the items in this next section assume that you have told other people that you have HIV, or that others know. This may not be true for you. If the item refers to something that has not actually happened to you, please imagine yourself in that situation. Please answer by putting the cross (x) in the block on how you think you would feel or how you think others would react to you.

	Strongly Disagree	Disagree	Agree	Strongly Agree
24. I have been hurt by how people reacted to learning I have HIV.				
25. I worry that people who know I have HIV will tell others.				
26. I regret having told some people that I have HIV.				
27. As a rule, telling others that I have HIV has been a mistake.				
28. Some people avoid touching me once they know I have HIV/				
29. People I care about stopped calling after learning I have HIV.				
30. People have told me that getting HIV is what I deserve for how I lived my life.				
31. Some people close to me are afraid others will reject them if it becomes known that I have HIV.				
32. People don't want me around their children once they know I have HIV.				
33. People have physically backed away from me when they learn I have HIV.				
34. Some people act as though it's my fault I have HIV.				
35. I have stopped socializing with some people because of their reactions to my having HIV.				
36. I have lost friends by telling them I have HIV.				
37. I have told people close to me to keep the fact that I have HIV a secret.				
38. People who know I have HIV tend to ignore my good points.				
39. People seem afraid of me once they learn I have HIV.				



40. When people learn you have HIV, they look for flaws in your character.				
--	--	--	--	--